UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION

3D SYSTEMS, INC., Plaintiff, v. **ENVISIONTEC, INC., ENVISIONTEC GMBH,** and **SIBCO, INC.,** Defendants.	Case No. 2:05-cv-74891 Hon. Avern Cohn Magistrate Judge Hon. R. Steven Whalen

DECLARATION OF ALEXANDER SHKOLNIK

I, Alexander Shkolnik, submit this Declaration in support of Defendants' Motion for Summary Judgment of Non-Infringement. The facts set forth below are based on my personal knowledge, and if called to testify, I could and would testify competently thereto:

1. I am employed as an engineer for Defendant Envisiontec, Inc. and I am responsible for the management of the operation of Envisiontec, Inc.'s facility in Torrance, California. I have been employed by Envisiontec for approximately 6 years and have over 10 years of experience in the rapid prototyping industry.

2. I received the Russian equivalent of a Bachelor of Science degree in Electrical Engineering from the Moscow Electrotechnical Institute of Communications in 1983.

3. In approximately 2002, I began collaborating with Mr. Al Siblani regarding the development of a "continuous build" rapid prototyping device as an alternative to rapid prototyping devices that use a layering approach. This device was eventually commercialized under the name "Vanquish." There are several Vanquish devices, including the Vanquish+

Perfactory^3 System, the Vanquish Flash Cure System, and the Vanquish+ Perfactory^3 ERM System. The Vanquish devices were recently re-named to "PerfactoryXtreme."

4. I contributed to and am familiar with numerous aspects of the design of the Vanquish devices, including the mechanical design, optics, firmware, and software. In addition, I have operated the Vanquish devices or witnessed their operation on numerous occasions. The Vanquish devices, just like the Perfactory devices, create a solid model of an object based on a computer aided design ("CAD") model. The solid model is formed from a photopolymer which is also known as a curable resin. The photopolymer is a viscous liquid that solidifies when light is applied to it. The process of solidifying the resin is generally referred to as "curing."

5. Each of the Vanquish devices includes a frame that houses a resin tank, a build platform, a digital light projector ("DLP"), and a pre-processing computer.

6. The DLP projector contains an array of mirrors, each one of which is movable. The movement of each mirror dictates the intensity of light projected from it. Further, each mirror projects a unique light intensity to a location on the surface of the curable resin. The light intensity and the length of time for which it is applied determines the depth to which the resin is cured. As a result, the DLP projector provides a unique curing depth for each location (also known as voxel location) across the surface of the resin. The DLP projector does not draw with a laser beam or other radiation as is disclosed in the patents in suit. Nor does the DLP projector use a beam of UV (ultraviolet) light or an electric beam. The DLP projector also does not use a spray, film, or mask.

7. The build platform of the Vanquish devices is mounted on a vertical support and moves continuously downward during the build process without stopping. The light that is used with the DLP projector is always on. Each mirror of the DLP projects light at the surface of the

resin, causing it to cure at the defined voxel location based on the particular DLP mirror to which it corresponds. As the Vanquish build platform moves downward, the previously cured resin also moves downward allowing uncured resin to flow over it. A cooling blade moves across the upper surface of the resin because of the large amount of heat that is generated. I have prepared an animation which is attached to Defendants' Motion for Summary Judgment as Exhibit 5 to provide a generic overview of the "continuous build" process that is used in the Vanquish machines.

8. The Vanquish devices do not form layers or uniform coatings of desired layer thickness over a previously formed layer. Instead, the solid object that is manufactured is a collection of three-dimensional voxel volumes, where each voxel volume has its own z-dimension that is being formed during continuous motion. The voxelization process that is used in the Vanquish devices in combination with the continuous motion downward and the DLP projector light always being on, makes it impossible to form "layers" or "cross sectional layers". Further, as the build platform moves downward in the Vanquish device, fresh resin flows over previously solidified resin such that there is neither a smooth surface nor a single thickness for the solidified resin.

9. In the animation that I prepared, Exhibit 5, I tried to illustrate why it is not possible to create a layer, a smooth or level surface, or a single thickness area in the cured resin as the build platform is moving continuously downward. As set forth previously, the DLP projector light is continuously on and the build platform is continuously moving downward. With this type of system, it is not possible to create layers or a smooth level surface because of the continuous motion of the build platform and the continuous movement of the resin. Further, since the voxel volumes contain information about the z-dimension which is unique for each

voxel, with individual voxel intensities for depth that can be above and below the maximum voxel depth, it is not possible to generate layers or cross-sectional layers using the voxelization process.

10. It is my understanding that the Court has interpreted the words "data representing the three dimensional object" as meaning the providing of "data representing adjacent cross sectional layers of the three dimensional object to be formed which was generated on CAD system". The Perfactory and Vanquish software creates a three-dimensional build envelope or volume which is subdivided into the voxel volume elements. After the intersection between each voxel volume and the three-dimensional part to be manufactured is determined, the intersection amount, if any, is converted into a brightness intensity value that is unique for each voxel and independent of any other voxel. The brightness intensity values, or grayscale values, are used in the bitmap stack for the entire build volume of the part to be manufactured before any exposure takes place. The creation of a three-dimensional build volume and the use of a voxelization process before manufacturing the part is completely different than "providing data representing adjacent cross sectional layers of the three dimensional object to be formed which was generated on CAD system". The Perfactory and Vanquish devices do not provide data representing adjacent cross sectional layers of an object. The voxelization process varies light intensity on a voxel-by-voxel basis when the light intensity for one voxel is independent of any other voxel.

11. I am familiar with rapid prototyping systems that use a layered process, like that disclosed in the patents in suit, in which fresh resin is supplied as a uniform coating with a desired layer thickness. Providing data representing adjacent cross sectional layers of the three dimensional object to be formed refers to curing cross-sections of an object from a slice file. This requires that the resin be cured with an irradiance that does not vary across the surface of

the resin.

12. In the Perfactory and Vanquish machines, the light intensity is varied on a voxel-by-voxel basis for providing a unique curing depth for each location across the surface of the resin. Further, in the Vanquish machine, the use of a continuous build process prevents any formation of discrete layers, and therefore, differs substantially from the process disclosed in the patents in suit. The continuous build process used in the Vanquish avoids the formation of visible lines separating adjacent layers. Layered processes involve stopping the build platform to allow uncured resin to flow over previously cured sections. When the platform starts moving, it must overcome a threshold viscous resistance of the curable resin. The threshold force required to overcome the resistance can distort or break previously cured sections. The continuous build process used in the Vanquish avoids this problem because the build platform never stops moving.

13. In the animation that I prepared to illustrate, for simulation purposes, the continuous build process used in the Vanquish machine, I show a wedge shape that is only representative of a frozen moment in time if the build platform had stopped. However, since there is not a moment in time that the build platform is not moving or that the DLP projector light is not on, my animation shows the wedge shapes to simulate frozen moments in time for the purpose of demonstrating that there are no layers being produced.

14. As the Vanquish build platform moves downward, a cooling blade intermittently moves across the upper surface of the resin because of the large amount of heat that is generated. Since the build platform is moving continuously downward, a substantial amount of heat is generated during the exothermic reaction of curing a specific resin based on the number of voxels, their intensity, the material viscosity, and other factors. Exhibit 10 shows the cooling

blade that is used in the Vanquish which is connected to corresponding flexible rubber belts on opposite ends of the cooling blade. The flexible rubber belts are driven by a rotating motor shaft. As the motor shaft rotates, causes the cooling blade to move across the surface of the resin.

15. The cooling blade in the Vanquish machine is spaced from the resin surface and a compressor is connected to the cooling blade for assisting the cooling blade in drawing the large amount of heat from the resin surface. Further, the movement of the cooling element is intermittent and occurs when the resin surface generates a substantial amount of heat.

16. It is my understanding that the patents in suit depict a motor driven threaded shaft that drives the movement of a recoater blade. A motor driven threaded shaft uses generally rigid components which transmit motor vibration to the resin or the build platform. This will disturb the curing process and result in deformities in the object being built. In contrast, the Vanquish device includes dual flexible rubber belts that transmit the movement of the motor to the cooling blade. The flexibility of the belts allows them to absorb vibrational energy and reduce the amount of vibration transmitted to the blade.

17. One of the patent claims in issue requires "an applicator". The Perfactory machines clearly do not include an applicator. The cooling element used in the Vanquish machines is not an applicator for the reasons previously stated. Further, there is a claim requirement for forming cross-sectional layers "over" previously formed cross-sectional layers. As stated previously, the build platform for the Vanquish machines moves continuously downward and does not form layers. Similarly, the Perfactory machines also do not form layers of material "over" previously formed cross-sectional layers since fresh resin flows beneath previously solidified resin.

18. One of the patent claims in issue requires a vacuum pump for drawing resin into the applicator. The Perfactory machines do not include a vacuum pump or an applicator, nor do they draw resin into an applicator. The Vanquish machine does not include a vacuum pump or an applicator; instead, it uses an intermittently movable cooling element and gravity feed from the continuous downward movement of the build platform.

19. The Vanquish devices also include a program called "Magics" that allows the user to design supports for the object being built. Exhibit 9 shows the supports that are designed by the Magics software which are the only supports that may be provided with the Vanquish devices. As shown, the supports for the Vanquish devices have numerous openings through them and also have a set of teeth which form the portion of the supports that contacts the object.

20. The Vanquish supports are not solid. They differ substantially from solid supports. Solid supports consume more resin and prolong the building process. In addition, solid supports increase the contact surface area with the object and are more difficult to remove from the object. Further, during the Vanquish build process, the part is immersed into the uncured resin. The use of supports with openings provides flow paths for the resin which reduces the forces on the supports thereby reducing the likelihood of distortion or breaking of the supports.

21. It should also be understood that the "barriers" formed in the Vanquish process are not the same as "supports". Even the barriers are perforated and not solid. More importantly, however, is that the barriers serve a totally different purpose. Due to the continuous movement of the build platform in the Vanquish machine, a certain amount of turbulence is caused in the resin by the passing of the cooling element. The barriers are designed to prevent

newly formed elements from being carried away which is the reason why they are not attached to the elements that they are protecting.

22. The operation of the Perfactory Software Suite, which is the software used on both the Perfactory and Vanquish machines, is explained in greater detail in the Declaration of Dr. Volker Schillen. A computer is required with a STL translator that is capable of reading CAD data and then translating it to a STL format. During the voxelization process, the STL file is converted into a three-dimensional format of individual voxel volumes before the building process takes place. Thus, this is yet another reason why the Perfactory and Vanquish devices do not convert CAD models into "data representing adjacent cross sectional layers of the three dimensional object to be formed which was generated on CAD system," since a CAD file is not a STL file, and the software used for the Perfactory and Vanquish machines cannot generate the required STL file from CAD data. Further, neither the Perfactory or Vanquish devices receive CAD data as an input and they do not generate CAD models nor do they include CAD generators.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Executed on this, the 29 day of July, 2008.

Alexander Shkolnik

CERTIFICATE OF SERVICE

I hereby certify that on August 4, 2008, I electronically filed the foregoing paper with the Clerk of the Court using the ECF system which will send notification of such filing to the following: Jonathan A. David, Susan M. Kornfield and Alan N. Harris, and I hereby certify that I have served the foregoing paper via Federal Express on the following non-ECF participants:

Sidney David
LERNER, DAVID, LITTENBERG,
KRUMHOLZ & MENTLIK, LLP
600 South Avenue West
Westfield, NJ 07090-1497

s/R. Terrance Rader

R. Terrance Rader (P28747)
RADER FISHMAN & GRAUER PLLC
39533 Woodward Avenue, Suite 140
Bloomfield Hills, MI 48304
Tel: 248-594-0600
Fax: 248-594-0610
Email: rtr@raderfishman.com